AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1-13. (Canceled).

14. (Currently amended): An electric-discharge machining apparatus for controlling a machining axis so that a machining average voltage Vg during a predetermined sampling time Ts agrees with a servo standard voltage SV, the apparatus comprising:

an electric power supplier for supplying electric power between electrodes of a tool electrode and a target to be machined;

an electric-discharge detection circuit for detecting ~~the~~ a waveform of electric discharge ~~generating~~ generated between the electrodes based on the electric power supplied by the electric power supplier;

an electric-discharge generation counter for counting in response to the waveform detected by the electric-discharge detection circuit an electric-discharge generation count Nd during the predetermined sampling time Ts;

a calculator for calculating an estimation average voltage Vgs between the electrodes, based on:

$$Vgs = V0 - \frac{Nd}{Ts} \times \{Ton \times (V0 - eg) + Toff \times V0\}$$

where Nd is the electric-discharge generation count, V0 is a predetermined applied voltage, Ton is a pulse width, Toff is a rest time, eg is an electric-discharge voltage, and Ts is the sampling time; and

an electrode-position controller for controlling the machining axis so that the estimation average voltage Vgs calculated by the calculator agrees with the servo standard voltage SV during the sampling time Ts.

15. (Currently amended): An electric-discharge machining apparatus as recited in claim 14, further comprising:

~~in addition to the electric-discharge generation counter,~~ a short-circuit generation counter for counting a short-circuit count N1 of short-circuit electric discharge in which the voltage of electric discharge accompanied by the applied voltage supplied by the electric power supplier is lower than a predetermined short-circuit threshold voltage Vsh, wherein calculation of the estimation average voltage Vgs by the calculator is compensated.

16. (Original): An electric-discharge machining apparatus as recited in claim 15, wherein the estimation average voltage Vgs is calculated by:

$$Vgs = V0 - \frac{Nd - N1}{Ts}\{Ton(V0 - eg) + Toff \times V0\} - \frac{N1}{Ts}\{V0 \times (Ton + Toff)\}$$

17. (Currently amended): An electric-discharge machining apparatus for controlling a machining axis so that a machining average voltage Vg during a predetermined sampling time Ts agrees with a servo standard voltage SV, the apparatus comprising:

an electric power supplier for supplying electric power between electrodes of a tool electrode and a target to be machined;

an electric-discharge detection circuit for detecting ~~the~~ a waveform of electric discharge ~~generating~~ generated between the electrodes based on the electric power supplied by the electric power supplier;

an electric-discharge generation counter for counting in response to the waveform detected by the electric-discharge detection circuit an electric-discharge generation count Nd during the predetermined sampling time Ts;

a short-circuit generation counter for counting a short-circuit count N1 of short-circuit electric discharge in which the voltage of electric discharge accompanied by the applied voltage supplied by the electric power supplier is lower than a predetermined short-circuit threshold voltage Vsh;

a small unloading electric-discharge counter for counting a small unloading electric-discharge count N2 of electric discharge to which the applied voltage supplied by the electric power supplier changes within a predetermined small unloading time Tdo;

a calculator for calculating an estimation average voltage Vgs between the electrodes, based on the electric-discharge generation count Nd, the short-circuit count N1, the small unloading electric-discharge count N2, and the abnormal electric-discharge count N3; and

an electrode-position controller for controlling the machining axis so that the estimation average voltage Vgs calculated by the calculator agrees with the servo standard voltage SV during the sampling time Ts.

18. (Original): An electric-discharge machining apparatus as recited in claim 17, wherein the estimation average voltage Vgs is calculated considering rest-time extension based on the electric-discharge generation other than normal electric-discharge generation.

19. (Original): An electric-discharge machining apparatus as recited in claim 18, wherein the estimation average voltage Vgs is calculated by:

$$Vgs = V0 - \frac{Nd - N1}{Ts}\{Ton(V0 - eg) + Toff \times V0\}$$

$$-\frac{N1}{Ts}\{V0(Ton + Toff)\} - \frac{1}{Ts}\{V0(N1 \times Toffs1 + N2 \times Toffs2 + N3 \times Toffs3)\}$$

where Toffs1 is a rest time according to the short circuit, Toffs2 is a rest time according to the small unloading electric discharge, and Toffs3 is a rest time according to the abnormal electric discharge.

20. (Currently amended): An electric-discharge machining apparatus for controlling a machining axis so that a machining average voltage Vg during a predetermined sampling time Ts agrees with a servo standard voltage SV, the apparatus comprising:

an electric power supplier for supplying electric power between electrodes of a tool electrode and a target to be machined;

an electric-discharge detection circuit for detecting ~~the~~ a waveform of electric discharge ~~generating~~ generated between the electrodes based on the electric power supplied by the electric power supplier;

an electric-discharge generation counter for counting in response to the waveform detected by the electric-discharge detection circuit an electric-discharge generation count Nd during the predetermined sampling time Ts;

a small unloading electric-discharge counter for counting a small unloading electric-discharge count N2 of electric discharge to which electric discharge accompanied by the applied voltage supplied by the electric power supplier changes within a predetermined small unloading time Tdo;

a calculator for calculating an estimation average voltage Vgs between the electrodes, based on the electric-discharge generation count Nd, and the small unloading electric-discharge count N2; and

an electrode-position controller for controlling the machining axis so that the estimation average voltage Vgs calculated by the calculator agrees with the servo standard voltage SV during the sampling time Ts.

21. (Original): An electric-discharge machining apparatus as recited in claim 20, wherein the small unloading time Tdo is set to 0.3 - 0.5 times a limited unloading time Tds calculated based on the average current density Id of the electric discharge.

22. (Currently amended): An electric-discharge machining method of controlling a machining axis so that a machining average voltage Vg during a predetermined sampling time Ts agrees with a servo standard voltage SV, the method comprising:

a step of detecting ~~the~~ a waveform of electric discharge generating, based on supplied electric power, between electrodes of a tool electrode and a target to be machined;

a step of counting in response to the waveform an electric-discharge generation count Nd during the predetermined sampling time Ts;

a step of calculating an estimation average voltage Vgs between the electrodes, based on the electric-discharge generation count Nd, and based on:

$$Vgs = V0 - \frac{Nd}{Ts} \times \{Ton \times (V0 - eg) + Toff \times V0\}$$

where V0 is a predetermined applied voltage, Ton is a pulse width, Toff is a rest time, eg is an electric-discharge voltage, and Ts is the sampling time; and

a step of controlling the machining axis so that the estimation average voltage Vgs calculated agrees with the servo standard voltage SV within the sampling time Ts.

23. (Original): An electric-discharge machining method as recited in claim 22, wherein the estimation average voltage Vgs is obtained by counting a short-circuit count N1 of short-circuit electric discharge in which the voltage of electric discharge accompanied by the applied voltage supplied by an electric power supplier is lower than a predetermined short-circuit threshold voltage Vsh, and by compensating using:

$$Vgs = V0 - \frac{Nd - N1}{Ts}\{Ton(V0 - eg) + Toff \times V0\} - \frac{N1}{Ts}\{V0 \times (Ton + Toff)\}$$

24. (Original): An electric-discharge machining method as recited in claim 22, wherein the estimation average voltage Vgs is obtained by counting a short-circuit count N1 of short-circuit electric discharge in which the voltage of electric discharge accompanied by the applied voltage supplied by an electric power supplier is lower than a predetermined short-circuit

threshold voltage Vsh, a small unloading electric-discharge count N2 of electric discharge to which the applied voltage supplied by the electric power supplier changes within a predetermined small unloading time Tdo, and an abnormal electric-discharge count N3 of abnormal electric discharge whose voltage reaches a lower value than a predetermined abnormal electric-discharge threshold voltage Vng, and by using:

$$Vgs = V0 - \frac{Nd - N1}{Ts}\{Ton(V0 - eg) + Toff \times V0\}$$

$$-\frac{N1}{Ts}\{V0(Ton + Toff)\} - \frac{1}{Ts}\{V0(N1 \times Toffs1 + N2 \times Toffs2 + N3 \times Toffs3)\}$$

where Toffs1 is a rest time according to the short circuit, Toffs2 is a rest time according to the small unloading electric discharge, and Toffs3 is a rest time according to the abnormal electric discharge.

25. (Original): An electric-discharge machining method of controlling a machining axis so that a machining average voltage Vg during a predetermined sampling time Ts agrees with a servo standard voltage SV, the method comprising:

a step of detecting ~~the~~ a waveform of electric discharge generating, based on supplied electric power, between electrodes of a tool electrode and a target to be machined;

a step of counting in response to the waveform an electric-discharge generation count Nd during the predetermined sampling time Ts;

a step of counting a small unloading electric-discharge count N2 of electric discharge to which electric discharge accompanied by the applied voltage supplied by an electric power supplier changes within a predetermined small unloading time Tdo,

a step of calculating an estimation average voltage Vgs between the electrodes, based on the electric-discharge counts Nd, and N2; and

a step of controlling the machining axis so that the estimation average voltage Vgs calculated agrees with the servo standard voltage SV during the sampling time Ts.